

REMARKS

Claims 1, 22 and 41 have been amended. Claims 9, 11-21, 27, 29-40, 47, 49-56, 64-70, 78-84 and 92-98 are canceled. Claims 58-63, 72-77 and 86-91 are withdrawn. Applicant reserves the right to pursue these claims in this and in other applications.

Claims 1-8, 10, 22-26, 28, 41-46, 48, 57, 71 and 85 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Deihl (WO 94/13280) in view of Fassberg et al (EP 0656206) and further in view of Kanios et al (U.S. Patent No. 5,719,197) or alternatively in view of the Physicians' Desk Reference, 1995 (PDR).

Independent claims 1, 22 and 41 recite methods of administering an effective amount of diazepam or a pharmaceutically acceptable salt thereof to a mammal comprising spraying the oral mucosa of the mammal with a propellant free buccal spray composition containing diazepam or a pharmaceutically acceptable salt thereof dissolved in a pharmacologically acceptable solvent; "wherein a therapeutically effective amount of diazepam is absorbed through the oral mucosa of the mammal to the mammal's systemic circulatory system."

The Office Action asserts that Deihl provides "general teachings of formulations for buccal mucosal administration" (Office Action at 4). The Office Action acknowledges, as it must, that Deihl fails to disclose diazepam, fails to disclose the use of the presently claimed solvents or amounts, including polyethylene glycol or non-polar solvents, and also fails to disclose oral transmucosal absorption of a therapeutically effective amount of any active delivered via oral spray .

Based on the alleged "general teaching" of Deihl, the Office Action asserts that it would have been obvious to "have looked in the art for other specific solvents suitable for spray formulations of liquid carriers, as taught by Fassberg et al., with reasonable expectations of successfully preparing suitable formulations for various therapies." (Office Action at 4). The Office Action also asserts that "it is obvious to one of ordinary skill in the art to have substituted any

suitable active agent for the analgesics of Deihl's buccal spray formulations as...taught by Kanios et al or Physicians' Desk Reference." (Office Action at 4-5, emphasis added).

Thus, the Office Action is premised on the PTO's reading of Deihl as a "general teaching" from which one may allegedly extrapolate to multiple other solvents and amounts, and to diazepam, and do so with a reasonable expectation of success. Remarkably, this reasoning is based in part on Fassberg et al., which is not directed to propellant-free sprays as claimed, and on Kanios or the PDR, which are not directed to buccal sprays at all. Aside from the shortcomings of these secondary references, Deihl itself is far from a "general teaching" of buccal spray formulations from which one of ordinary skill at the time of the present invention would have expected much of anything at all, much less that one of ordinary skill would have been motivated in any way to modify Deihl with any reasonable expectation of successfully achieving the presently claimed methods.

More specifically, at the time of the present invention, Deihl would not have been considered a credible teaching and, for the reasons discussed below, would not have been relied upon in any capacity by those skilled in the art at the time that the present invention was made. Deihl purports to teach a sprayable analgesic composition where an analgesic is capable of being absorbed into the bloodstream through the buccal mucosa. Deihl's composition includes ibuprofen or acetaminophen and aqueous ethanol. Deihl states that for treatment of a head ache, a patient sprays four measured sprays into the mouth. Each spray is 50 microliters and contains 1 milligram of acetaminophen or ibuprofen. This treatment is repeated once after five minutes. That is, Deihl teaches a total dose of 4-8 milligrams of acetaminophen or ibuprofen. Deihl at 5.

Even assuming 100 percent bioavailability, however, those of ordinary skill in the art would readily appreciate that Diehl's 4-8 milligram dose of acetaminophen or ibuprofen is not even remotely therapeutically effective. According to GOODMAN AND GILMAN'S THE PHARMACOLOGICAL BASIS OF THERAPEUTICS, 10th ed., the oral dosage for acetaminophen is 320 to 1000 milligrams for adults and 40 to 480 milligrams for children with about 88% bioavailability.

For ibuprofen the oral dosage for adults is 400 milligrams for mild pain to as much as 3200 milligrams for arthritis, with about 80% bioavailability. Thus, even assuming 100% bioavailability, a patient receiving Deihl's formulation would receive only 4-8 milligrams of active agent, a tiny fraction of what is required for any therapeutic effect. A patient would need to administer a completely unworkable number of spray activations of Deihl's formulation to realize any potential therapeutic effect, but by that point the volume and fluid sprayed would be so great as to result in swallowing and thus avoid mucosal absorption. Therefore, one of ordinary skill in the art would have readily appreciated that Deihl's spray composition and method is unworkable and ineffective.

One of ordinary skill in the art would also have appreciated that Deihl's ineffective spray teachings were quite consistent with the state of the art at the time the present invention was made. Those skilled in the art generally perceived buccal administration as an ineffective and unworkable delivery method. For example, REMINGTON: THE SCIENCE AND PRACTICE OF PHARMACY, 19th ed. (1995) at 710, states that "when only small amounts of drugs are required to gain access to the blood, the buccal route may be satisfactory, providing the physicochemical prerequisites for absorption by this route are present in the drug and dosage form. Only a few drugs may be given successfully by this route." (Emphasis added).

This well accepted view of buccal administration was based in part on the belief that the relatively rapid clearing of the mouth by swallowing limited the buccal absorption phase to between about 5-10 minutes. Therefore, it was understood that the amount of drug delivered would be very small causing the blood plasma levels of drugs administered buccally to rise slowly. Thus, buccal administration was generally disfavored and thought to be an ineffective and unworkable delivery method. Consequently, the disclosure of Deihl itself, as well as the general understanding in the art, were completely inconsistent with the Office Action's assertions that Deihl provides a general teaching from which one of ordinary skill would have been motivated to extrapolate to diazepam and diverse solvents, much less to do so with any expectation of success in administering a therapeutically effective amount of diazepam via oral absorption of a buccal spray.

Furthermore, even if Diehl could be properly combined with the secondary references, the combination still would not provide all elements of the claims as amended, since Diehl (the only oral spray cited) does not itself disclose or achieve absorption of a therapeutically effective amount of any active delivered via oral spray.

In addition, Fassberg et al. relates to an inhalation aerosol, which is a propellant-containing spray or powder formulation for oral and/or nasal administration. Fassberg et al. does not disclose or suggest any propellant-free method for the delivery of an active agent by spraying the buccal mucosa of a mammal. Fassberg et al. clearly does not teach or suggest buccal administration of any actives.

According to the PTO, it would have been obvious to modify Diehl with the solvents disclosed by Fassberg et al. (Office Action at 4). To the contrary, one of ordinary skill would not have used the Fassberg et al. solvents to modify the formulations of Diehl, because Fassberg et al. explains that the solvents used in its inhalation formulations are only present to facilitate the propellant. Diehl has no propellant and the present claims exclude propellants. Accordingly, one of ordinary skill in the art would not have been motivated to modify Diehl with the teachings of Fassberg et al., for this additional reason.

One of ordinary skill in the art could not have been motivated to modify Diehl, which provided no therapeutic effect, with the actives of Kanios et al. or the PDR, with any expectations of success in achieving the methods recited by the presently pending claims. Kanios et al. refers to an intermediate composition that is made into a “finished dosage form” by applying a flexible backing which further defines the size and shape of the finished dosage form, which is, among other things, occlusive to water permeation in vivo. Kanios et al. is entirely unrelated to a buccal spray method for transmucosal administration. The PDR simply lists various active compounds and, like Kanios et al., is entirely unrelated to a buccal spray method for transmucosal administration.

Consequently, none of the prior art of record alone or in any combination teaches all elements of the present Applicants' independent claims. In particular, none of the art alone or in combination teaches transmucosal absorption of a therapeutically effective amount of diazepam by spraying the oral mucosa. Moreover, the state of the art, including Remington: *The Science and Practice of Pharmacology*, teaches away from the Applicants' invention as presently claimed. Remington demonstrates that "only a few drugs may be given successfully by [the buccal spray] rate" and Deihl's method was apparently unsuccessful. Furthermore, in addition to the general but significant bias in the art (at the time of the invention) against buccal spray administration, Applicants have discovered surprisingly beneficial results from their use of a buccal spray which further supports the non-obviousness of the claimed invention. See, e.g., specification at paragraph [0011] and [0036]. For at least these reasons, Applicants respectfully request that this § 103 rejection be withdrawn.

Claims 1-8, 10, 22-26, 28, 41-46, 48, 57, 71 and 85 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fu (WO 9303751) in view of the Physician's Drug Reference (PDR). This rejection is respectfully traversed.

The Office Action also improperly uses Fu as a "general teaching" from which one of ordinary skill could have allegedly extrapolated to diazepam, and have done so with at least a reasonable expectation of success, based on "the general teachings of formulations for buccal mucosal administration of Fu" (Office action at 6). The Office Action is mistaken, as Fu is anything but a general teaching that would have motivated one of ordinary skill to look to the PDR with any expectation of success and the general state of the art at the time of the present invention was to the contrary.

As discussed above, those skilled in the art perceived buccal administration as an ineffective and unworkable delivery method. See, REMINGTON: THE SCIENCE AND PRACTICE OF PHARMACY, 19th ed. (1995) at 710. Fu refers to compositions for the sublingual delivery of specific polypeptides that are normally degraded upon oral administration. Fu is specifically directed to the

administration of these polypeptides because they cannot be orally ingested. These polypeptides are very limited in scope. Fu only present examples of formulations containing leuprolide acetate and deslorelin acetate, which is closely related to leuprolide acetate. At most, Fu establishes that buccal administration can be used for specific polypeptides and only when a permeation enhancer is employed. See e.g., Fu at 10-12 (showing low bioavailability for exemplary formulations, less than 25% bioavailability for all but one formulation). This underscores the general state of the art regarding the problem with buccal sprays as described by Remington.

The examples provided by Fu are limited to two closely related polypeptides that can not be administered by oral ingestion. Thus, Fu would not have been viewed as a “general teaching” for successful buccal spray administration of diazepam. Therefore, one of ordinary skill in the art would not have been motivated to modify Fu with the pharmaceutical actives of the PDR, or expect that such a combination would have been viable for administering a pharmacologically effective amount of diazepam.

None of the prior art of record alone or in any combination teaches all elements of the present Applicants’ independent claims. In particular, none of the art teaches transmucosal absorption of an effective amount of diazepam by spraying the oral mucosa, as required by all of the pending claims.

Furthermore, in addition to the general but significant bias in the art (at the time of the invention) against buccal spray administration, that the Applicants have discovered surprisingly beneficial results from their use of a buccal spray further supports the non-obviousness of the claimed invention. See, e.g., specification at paragraph [0011] and [0036]. For at least these reasons, Applicants respectfully request that this rejection be withdrawn.

Double Patenting

Claims 1-8, 10, 22-26, 28, 41-46, 48, 57, 71 and 85 are rejected on the grounds of non-statutory obviousness-type double patenting as being unpatentable over claims of U.S. patent no. 6,110,486, and are also provisionally rejected over claims of co-pending application number 09/537,118. As the claims of the present application, as well as those of the co-pending applications are subject to change, Applicants respectfully request that these rejections be held in abeyance until such time as this application is otherwise in a condition for allowance.

Except for the double patenting issues, each of the presently pending claims in this application is believed to be in a condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims. Should the Examiner believe that anything further may be requested to place this application in even better form for allowance, the Examiner is cordially invited to telephone the undersigned attorneys for Applicants.

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